

August 21, 2020

Mr. Dan Carlton, Superintendent
Georgetown Charter Township
PO Box 769
Jenison, MI 49429

RE: Hidden Lake West Lift Station Analysis
Georgetown Charter Township

Dear Dan:

Hidden Lake West is a proposed development east of 48th Avenue and north of Baldwin Street with a proposed 63 developable lots. To provide sanitary sewer for the development, the developer's engineer Exxel Engineering is looking to move the existing Hidden Lake lift station (at the end of the Hidden Ridge Drive cul-de-sac) to the northwest corner of the proposed development on 48th Avenue. Before accepting this location change, Georgetown Charter Township hired Prein&Newhof to review and answer the following questions:

1. Is the proposed location for the lift station acceptable as the permanent location for the master planned location on 48th Avenue?
2. What design flow for the interim design of the new station?
3. What is the ultimate design flow and lift station parameters?
4. Will the existing 6 inch force main and downstream gravity main be able to handle the interim flow?

The below letter will describe how Prein&Newhof was able to review and answer the questions listed above.

Location of the Future 48th Avenue Lift Station

Georgetown Charter Township's sanitary sewer master plan from May 2015 indicated that a future lift station would be located on Hudsonville Public Schools' Bauer Elementary School site east of 48th Avenue, which is approximately 2,100 feet south of the intersection of Bauer Road. This lift station would be used to ultimately serve customers in most of the northwest portion of Georgetown Charter Township and possibly portions of Blendon Township just west of 48th Avenue. As part of the Hidden Lake West development, Exxel proposed to construct this future lift station at the northwest corner of the Hidden Lake West property on 48th Avenue, which is approximately 2,650 feet south of Bauer Road and 550 feet south of the proposed location for the future lift station. By moving the location to Hidden Lake West, the depth of the gravity sewer going into the lift station will be approximately 24 feet instead of 21 feet at the Bauer Elementary School location. The approximate difference in depth of 3 feet is not a concern for the overall future planning of the sanitary sewer for this area. The Township should consider the size of the

site to be dedicated to the Township for this pump station to assure constructability now and in the future.

Interim Design Review

Capacities of the existing sewer system were also reviewed to determine what the interim design of the new station should be and how long the interim station can remain operational until flows need to be diverted to the proposed new force main to the south along 48th Avenue.

Prein&Newhof reviewed the following possible restricted flow areas south of where the existing Hidden Lake 6 inch force main discharges into the 10 inch gravity sewer system at Hidden Ridge Court and Hidden Ridge Drive to determine the amount of capacity that is remaining in the pipes in these areas:

10 inch Sanitary Sewer at Hidden Forest Drive just north of Glen Hollow Drive

12 inch Sanitary Sewer at Bridgeport Drive

18 inch Sanitary Sewer right before the Port Sheldon Lift Station

Table 1 below details how the peak flow, flowing full, and the remaining capacity were calculated for these areas. Table 1 also provides the calculated current peak flow going into the existing Hidden Lake lift station and the Port Sheldon Lift Station. Please note that these stations do not currently have flow meters.

Table 1 – Peak Flow Calculations for Potential Restricted Areas

Pipe Size / Location	Service Area REU Estimate ¹	Service Area Pop. Estimate ²	Average Day Flow Estimate ³ (gpm)	Peaking Factor ⁴	Peak Hour Flow Est. ⁵ (gpm)	Flowing Full Cap. ⁶ (gpm)	Capacity Remain. (gpm)
Hidden Lake LS	190	555	39	3.95	152	N/A	N/A
Port Sheldon LS	1,874	5,473	380	3.21	1,220	N/A	N/A
10 inch	330	964	67	3.81	255	522	267
12 inch	960	2,803	195	3.47	675	786	111
18 inch	1,495	4,365	303	3.30	1,000	1,891	891

Notes:

1. REU (residential equivalent unit) Estimate is based on the current number of parcels that are connected to the sanitary sewer system in this area.
2. The average household size in Georgetown Charter Township per the 2010 census was 2.92 people per house. REU estimates were multiplied by 2.92 to determine a cumulative population estimate upstream of each pump station.
3. Average Flow estimates were determined from cumulative population estimates and an assumed 100 gpcd flow upstream of each pump station (per 10 state standards).
4. The peak hour Peaking Factor for each pump station was estimated using the Recommended Standards for Wastewater Facilities equation for wastewater peaking.
5. The Peak Flow Estimate was determined by multiplying the Average Flow Estimate by the Peaking Factor.
6. Flowing full capacity calculated by using slopes provided from record drawings and a Manning's n of 0.013.

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The restricted capacity for future growth is approximately 111 gpm, which is the remaining capacity in the 12 inch sewer at Bridgeport Drive. The interim design for the pumps at the station should be able to handle the peak flow from the existing Hidden Lake lift station (estimated to be 152 gpm from Table 1) and to also handle the remaining restricted capacity for future growth, which would be the remaining capacity in the 12 inch sewer which is equal to 111 gpm. Therefore we recommend that the interim design should be able to handle 260 gpm. This would provide an additional estimated capacity of 158 REUs, in which the proposed Hidden Lake West development is would use 63 of those REUs, leaving a remaining growth of an estimated 95 REUs for the future in this area.

Ultimate Design Review

Table 1 also provides the peak hour flow into the Port Sheldon Lift Station, which is approximately 1,220 gpm. Since the design capacity of the Port Sheldon Lift Station is 1,750 gpm, the remaining capacity for the lift station would then be approximately 530 gpm. For the purposes of this report, the ultimate design flow is estimated to be approximately 530 gpm (assuming no additional improvements are made to the Port Sheldon Lift Station). This design flow will need to be evaluated in the future to determine if some of this additional capacity left in the station should be taken out for future development to the south of the Port Sheldon Lift Station instead of all be used for development to the north. This capacity should be considered when designing the pump station as some components may need to be planned for upgrading to this flow in the future.

In summary, the pump station could be constructed at the location as shown on the drawings submitted to our office. Based on our records and the information received, this station should be initially sized for a flow of 260 gpm. (The current station for Hidden Lakes is designed for 180 gpm). In the future, this station may need approximately 9,000 feet of force main constructed to the south to the existing 18 inch sanitary sewer in 48th Avenue approximately 1,335 feet north of the intersection of Port Sheldon Street and the capacity at the station increased to about 530 gpm. The design of the proposed station should consider the future flow and incorporate the appropriate components in the design to minimize the reconstruction of the pump station.

If you have any questions regarding the above, please feel free to contact me or Ken Bosma of our office to further discuss.

Sincerely,



Prein&Newhof

Lucas J. Timmer, P.E.

LJT/ljt

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HIDDEN LAKE ESTATES NO. 2

Lift Station Design

Number of Lots = 216 (Maximum allowable to this lift station, per Township.)

Population = 4 persons per lot x 216 = 864 people

Average Flow = 75 gpd/person x 864 people = 64,800 gpd = 45 gpm

Peak Flow = 4 x 45 = 180 gpm

Design Flow = 180 gpm

Length of Force Main = 1100 l.f.

Force Main Size = 6"

TDH = 27 ft.

Pump Specifications:

Number of Pumps = 2
Pump Capacity = 180
Pump Size = 5.H.P. (1170 RPM)
Power Requirements = Three Phase

Wet Well Working Volume:

(6' Dia. wet well, from elev. 645.23 to 647.73) = 530 gal.

Wet Well Fill Time:

· at average flow = 11.8 min.
· at maximum flow = 2.9 min.

TS/bg

D921017E

PLANNERS ENGINEERS SURVEYORS

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